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## Penicillinase-Producing *Neisseria gonorrhoeae* in Various Seaport Cities of Latin America

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One hundred fifteen acute cases of gonorrhea were documented in U. S. military personnel during a five-month cruise in which 22 port cities of Latin America were visited in 1985. Penicillinase-producing *Neisseria gonorrhoeae* (PPNG) was isolated from 23 (20%) of the 115 cases. No penicillin-resistant,  $\beta$ -lactamase-negative gonococci were encountered. None of the ten cases of gonorrhea acquired in the Caribbean region was due to PPNG. In South America, the PPNG infection rate was 35% (19/54) in ports along the Pacific Ocean and 8% (4/51) in those along the Atlantic. Infections incurred in four cities of three countries on the Pacific coast of the South American continent accounted for 78% of all PPNG isolates. Although the study did not deal directly with infections in the local populations, the data suggest that PPNG are common in coastal South America and that hyperendemic foci exist in some cities of the continent's western coast.

PENICILLINASE-PRODUCING *Neisseria gonorrhoeae* (PPNG) were first reported in the United States and England in 1976.<sup>1,2</sup> Today they are probably distributed worldwide<sup>3-5</sup> and are likely to increase in prevalence.

There are few reports on the prevalence of PPNG in Latin America. Most were published in local journals only, and the information is not readily available to physicians or public health workers in developed countries. This report presents the results of in-vitro penicillin susceptibility tests strains isolated from U. S. military personnel during a goodwill cruise to Latin America in the latter half of 1985. It is apparently the first report suggesting that endemic foci of PPNG now exist in South America.

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### Materials and Methods

Approximately 400 personnel aboard a single ship participated in the study. One to five seaport cities were visited in each of nine countries. Individuals seeking shipboard medical attention because of urethral discharge or dysuria were examined, and urethral exudate or scrapings were gram-stained and cultured on Thayer-Martin medium. Cultures were incubated in a candle-extinction jar at 36 C and examined at 24 and 48 hr.

*Neisseria gonorrhoeae* was presumptively identified by growth on the selective medium, colonial characteristics, gram reaction and morphology, and catalase and oxidase tests. Presumed gonococcal isolates were later identified definitively by a rapid test.<sup>6</sup> Susceptibility tests were done by disk diffusion using 10-unit penicillin disks (BBL Division of Becton Dickinson Co., Cockeysville, MD), originally on chocolate agar and later on the same medium without hemoglobin.<sup>7</sup> Isolates with inhibition zones of  $\geq 30$  mm were regarded as sensitive to penicillin. All isolates were tested for  $\beta$ -lactamase by the Cefinase method (BBL).

The origin of each infection was determined by prospective interview of patients. In most cases it was possible to identify accurately the city and date of infection. However, in ~10% of cases this information could not be definitively ascertained because of multiple exposures in cities visited successively. Such cases were arbitrarily attributed to the city where sexual exposure had occurred most recently within an incubation period of two to ten days.

Initial treatment consisted of 1.0 g of probenecid given by mouth and  $4.8 \times 10^6$  units of procaine penicillin given im. Treatment with 2.0 g of spectinomycin (im) was given when the initial isolate was a PPNG. All patients had a test-of-cure culture for *N. gonorrhoeae* on days 4-7 after treatment.

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TABLE 1. Port-Calls, Gonorrhea Cases, and Infection Rates during Latin American Cruise of a U.S. Navy Ship, 1985

Location of Port Cities	No. of Days in Port	Gonorrhea Cases		Infection Rates*	
		Total No.	No. (%) PPNG	Total	PPNG
Caribbean	17	10	0	0.6	0.0
Puerto Rico	7	0	0	0.0	0.0
Venezuela	4	0	0	0.0	0.0
Columbia	3	9	0	3.0	0.0
Panama	3	1	0	0.3	0.0
South America, west coast	40	54	19 (35)	1.4	0.5
Ecuador	6	4	1 (25)	0.7	0.2
Peru	11	8	1 (13)	0.7	0.1
Chile	23	42	17 (41)	1.8	0.7
South America, east coast	15	51	4 (8)	3.4	0.3
Uruguay	6	11	2 (18)	1.8	0.3
Brazil	9	40	2 (5)	4.4	0.2
Total	72	115	23 (20)	1.6	0.3

\* Per day in port.

### Results

The port cities visited during the cruise were San Juan and Viequez, Puerto Rico; Puerto Cabello, Venezuela; Cartagena and Covinas, Columbia; Panama City, Panama; Esmeraldas, Tamaco, Guayaquil, and Manta, Ecuador; Lima and Salinas, Peru; Antofagasta, Valparaiso, Talcahuano, Puerto Montt, Chacabuco, and Punta Arenas, Chile; Montevideo, Uruguay; and Santos, Mantose Island, and Rio de Janeiro, Brazil. The duration of portcalls varied from several hours to six days. Total days in port and the number and rate of infections are shown in table 1.

There were 115 culture-confirmed cases of gonorrhea during the cruise; all occurred among 96 of the shipboard personnel. All of them avowed to have been without signs or symptoms of the disease upon deployment. Ten cases were noted in the Caribbean. In South America, 54 cases occurred in the western and 51 in the eastern ports. Pervasiveness, in terms of number of cases per day in port, was greatest in the eastern ports of South America, where there were 3.4 cases per day, as compared with 1.4 in the western ports and 0.6 in the Caribbean.

Strains of PPNG were isolated from 23 (20%) of the 115 cases. Isolates from the remaining cases were  $\beta$ -lactamase-negative and sensitive to penicillin in vitro. All PPNG infections were incurred in South America, and 19 (83%) were acquired in Pacific ports. Contact interviews revealed that 18 were acquired in Guayaquil, Ecuador; Lima, Peru; or Valparaiso or Talcahuano, Chile. Overall, the PPNG rates were considerably

greater in Pacific Ocean ports (19/54; 35%) than in Atlantic ports (4/51; 8%) of South America ( $p < 0.01$ ,  $\chi^2$  test).

All infections responded satisfactorily to therapy with penicillin or spectinomycin. When the first PPNG cases were noted, the patients were recalled and treated with spectinomycin without any attempt to determine whether penicillin treatment had failed. Subsequently, initial treatment with either antibiotic was based on culture and results of  $\beta$ -lactamase tests rather than direct gram stains alone. All test-of-cure cultures were uniformly negative.

### Discussion

Relatively few cases of gonorrhea, none due to PPNG, were contracted by the shipboard personnel in the Caribbean. Gonococcal infections were more pervasive in South America, the number of cases being approximately equal along the west and east coasts. However, the proportion caused by PPNG was considerably greater along the Pacific side of the continent (35%) than along the Atlantic (8%). The overall PPNG rate of 20% is not surprising considering reports of significant endemicity in other areas of the world.<sup>3-5</sup>

Our study may not reflect accurately the actual epidemiologic status of PPNG in the several areas visited by the ship. Firstly, the number of infections was relatively small, and the data were tabulated by country and broader geographic region in order to minimize inaccuracies due to this factor. A second limitation is that most infections were probably acquired from prostitutes, some perhaps attracted from larger or neighboring communities. Although most of the prostitutes would be expected to operate in a defined region, largely within their home country, it is difficult to assess the degree to which their strains differ from those of nonprostitutes. Thirdly, the possibility of sexual exposure to a single or few infected persons was not investigated; although chances of such activity were equal for all prostitutes, whether infected with PPNG or non-PPNG strains, the observed PPNG rates may be inflated to a degree directly proportional to the amount of sexual activity.

The limitations imposed on interpretation of the data by these factors should not distract from the overall, relatively strong observation that PPNG exist throughout much of coastal South America. Our data undoubtedly best reflect what might be expected during cruise ship visits, large conventions, or similar tourist activities. To the extent that the deployed personnel maintained their sexual behavior relatively unchanged throughout the cruise, especially in regard to the degree of sexual activity, the data also suggest that PPNG are more highly endemic on the west than on the east coast of the continent. The very few cases of gonorrhea ac-

quired in the Caribbean precludes comment on strains in that region.

When PPNG initially appeared in western Europe and the United States, infections were attributed to importation from the Far East or west coast of Africa.<sup>8,9</sup> These strains soon became endemic. They were generally acquired in-country in the Netherlands by 1978 and in the United States by 1980.<sup>10,11</sup>

Few reports are available on gonococcal resistance to penicillin in Latin America. Studies in Jamaica, Puerto Rico, the Netherlands Antilles, and Chile prior to 1984 revealed that zero to 3% of isolates were PPNG.<sup>12-15</sup> In Puerto Rico, 8.6% were PPNG in 1984, and penicillin resistance due to non-PPNG strains (i.e., chromosomal resistance) has existed there at a 20% rate since 1981.<sup>13</sup> In the Chilean study,<sup>15</sup> one-third of the PPNG carried the 24.5-Mdalton plasmid, known to confer increased capability for transfer of the  $\beta$ -lactamase trait.<sup>16</sup> The large proportion of PPNG contracted by the ship's crew in the Pacific ports of South America suggests that the stage of endemic transmission has been reached in at least some regions of that part of the world.

Periodic surveillance of gonococci throughout Latin America is necessary to assess and update data on susceptibility to antibiotics. Tests of cure should be done, particularly when treatment is prescribed without knowledge of the susceptibility of the infecting strain or of strains prevailing in the region.

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